**Safety Evaluation by the DOE Regulatory Unit
of Proposed Authorization Amendment Request
ABAR-W375-00-00014
To the Initial Safety Analysis Report**

1.0 Introduction

The River Protection Project-Waste Treatment Plant (RPP-WTP), formerly the Tank Waste Remediation System-Privatization facility, is a project to construct a facility to treat and immobilize High-Level (radioactive) Waste (HLW) contained in underground tanks at the Hanford site. The regulatory process associated with RPP-WTP requires the contractor assigned to design and build the facility to maintain updated authorization basis documents. authorization basis documents constitute the information provided by the contractor to the DOE Regulatory Unit (RU) that describe radiological, nuclear, and process safety requirements that form the bases for regulatory authorization of the related activities.

The Hazards Analysis Report (HAR) and the Initial Safety Analysis Report (ISAR) are two authorization basis documents. The contractor is required to update these documents whenever changes are identified in the significant and bounding hazards described in the HAR or whenever changes are identified in the fundamental aspects of design described in the ISAR. By letters dated April 23, 2000,[1] and May 19, 2000,[2] the contractor submitted amendments to the HAR and ISAR to incorporate changes. By letter dated July 6, 2000,[3] the RU approved changes to the HAR but disapproved proposed changes to the ISAR. The ISAR changes were disapproved because a safety evaluation was not provided to document safety considerations associated with the proposed ISAR changes. By letter dated July 26, 2000,[4] the contractor, BNFL Inc. (BNFL), provided the required safety analysis for the proposed ISAR changes. This evaluation of the ISAR changes is based in part on the additional information provided by the contractor.

2.0 Background

The Contractor proposed to identify the fundamental aspects of design in a new Appendix A to the ISAR. In the initial ABAR submittal, dated April 24, 2000, the Contractor identified eight changes to fundamental aspects of design. The Contractor considered two of the changes to be a reduction in commitment requiring RU approval. These included:

a. Addition of approximately 1.5 million gallons capacity for receipt and storage of Low-Activity Waste (LAW) in the pretreatment facility instead of using the existing double-shell tank (DST) 241-AP-106; and

b. Washing and storage of HLW solids from the tank farm operating contractor.

The RU review of the changes to fundamental aspects of design concluded a third change may also result in a reduction in commitment and requires RU approval. Specifically, the separation of one large processing facility into four facilities is potentially a reduction.

3.0 Evaluation

3.1 Applicable Requirements

ISMP Section 3.3.1.3 states those portions of the ISAR that relate to fundamental aspects of design are considered part of the authorization basis.

RL/REG-97-13, *RU Position on Contractor-Initiated Changes to the Authorization Basis*, requires ABARs to include a safety evaluation.

3.2 Authorization Basis Deviations

3.2.1 Addition of Six LAW Feed tanks to the Pretreatment Facility

BNFL and the Office of River Protection (ORP) completed an engineering study evaluating options for storing LAW feed. The study concluded an integrated, multi-tank capability in the pretreatment facility or an adjacent vault would be the preferred configuration. ORP modified the Contract[5] to require BNFL to provide this storage capacity. Storage of up to 1.5 million gallons of LAW feed will be accomplished by the addition of six 250,000-gallon vessels to the pretreatment facility.

Storage of LAW feed in the pretreatment facility shifts radioactive inventory from the existing DST farm to the pretreatment facility. Hazards from frequent waste transfers to the facility are modified by making less frequent larger volume transfers. Hazards associated with the storage of LAW in a one million gallon tank are transferred to the pretreatment facility where they may be controlled through the use of multiple smaller tanks and control features integrated with the facility.

BNFL has identified the primary hazards associated with this work through their Integrated Safety Management (ISM) process. Primary hazards include direct radiation from vessels and piping, leaks and spills of radioactive material that may enter the workplace or environment, and accumulation of hydrogen in vessels resulting in explosive hazards.

BNFL has identified the following controls to address these hazards:

a. Vessels will be located in cells that provide radiation shielding and confinement.

b. Cells will be ventilated by the C5 ventilation system and filtered to acceptable contamination limits.

c. Vessels will be of high quality and be designed for the life of the facility.

d. Vessels will be vented through the process vessel vent system to prevent accumulation of flammable gasses.

The LAW feed receipt vessels; confinement and filtration functions of the C5 ventilation system; and process vessel vent system are preliminarily classified as safety design class structures, systems, and components.

BNFL states no changes to the applicable codes or standards in the SRD are required for this change.

The RU considers that the hazards introduced by the addition of six LAW storage tanks can be controlled and that control strategies being developed by the ISM process appear appropriate. The existing design and ISM controls are in advanced conceptual stage. The RU will continue to evaluate these items as the design progresses.

3.2.2 Addition of Treatment and Storage of HLW Solids

The decision to include requirements to wash and store HLW solids in the pretreatment facility was made by ORP in 1998 prior to the authorization of Part B-1 of the Contract. Treatment of HLW solids consists of caustic washing with up to three molar sodium-hydroxide solutions. Washing will occur in the ultra filtration portion of the HLW pretreatment process. Also, vessels to store washed solids have been added to the facility.

Washing and storage of HLW solids in the pretreatment facility shifts the risk for performing this operation from the site tank farm operating contractor to BNFL. Additionally, inventories of radioactive material are shifted from the DST farm to the pretreatment facility.

BNFL has identified the primary hazards associated with this work through their ISM process. Primary hazards include direct radiation from vessels and pipe work, leaks and spills of radioactive material that may enter the workplace or environment, accumulation of hydrogen in vessels resulting in explosive hazards, and episodic hydrogen releases following solids settling.

BNFL has identified the following controls to address these hazards:

a. Vessels will be located in cells that provide radiation shielding and confinement.

b. Cells will be ventilated by the C5 ventilation system and filtered to acceptable contamination limits.

c. Vessels will be of high quality and be designed for the life of the facility.

d. Vessels will be vented through the process vessel vent system to prevent accumulation of flammable gasses.

e. Solids will not be permitted to remain settled long enough to cause an episodic release of hydrogen.

The HLW feed receipt and treated solids storage vessels; confinement and filtration functions of the C5 ventilation system; and process vessel vent system are preliminarily classified as safety design class structures, systems, and components.

BNFL states no changes to the applicable codes and standards in the SRD are required for this change.

The RU considers that the hazards introduced by the addition of HLW treatment and storage functions can be controlled and that control strategies being developed by the ISM process appear appropriate. The existing design and ISM controls are in a preliminary stage. The RU will continue to evaluate these items as the design progresses.

3.2.3 Separation of the Process Building into Individual Process Buildings

Prior to the authorization of Contract Part B-1 in 1998, BNFL revised its technical baseline to separate the one large processing facility, which included pretreatment and vitrification functions into separate processing facilities. The current technical baseline has four primary processing facilities consisting of pretreatment, LAW vitrification, HLW vitrification, and LAW pretreatment. The change in facility configuration was made to accelerate the construction and operating schedules while reducing project risk by simplifying design, construction, and startup.

The processes performed in the four facilities have not changed from that performed in the single large facility and BNFL states the four facilities provide the confinement necessary for the associated process hazards. The new hazards posed by this change are associated with the increased number and type of waste transfers between facilities.

BNFL has identified primary hazards associated with the increased number and type of inter-facility waste transfers. Primary hazards include direct radiation from an unshielded transfer line, leaks and spills of radioactive material that could enter the environment, and transfer of incorrect material resulting in an unacceptable source term or adverse chemical reaction.

BNFL has identified the following controls to address these hazards:

a. Transfer lines will be buried to provide shielding from direct exposure.

b. Transfer lines will be coaxial lines with leak detection.

c. Controls will be placed on material composition and radionuclide content prior to transfer.

Transfer lines and procedures used for material controls prior to transfer are preliminarily classified as safety design class.

The RU considers that the hazards introduced by the increased number and type of inter-facility transfers can be controlled and that control strategies being developed appear to be appropriate. The existing design and ISM controls are in a preliminary stage. The RU will continue to evaluate these items as the design progresses.

4.0 Conclusions

On the basis of the considerations described above, the RU has concluded that there is reasonable assurance that the health and safety of the public and the workers will not be adversely affected by the proposed amendment to the ISAR identifying fundamental aspects of design. The proposed amendment complies with applicable laws, regulations, and requirements, and it is in conformance with DOE-stipulated safety standards and principles. Accordingly, this review concludes that the proposed changes to the ISAR would not adversely affect the objectives of the RPP-WTP authorization basis in terms of the criteria delineated above.

5.0 References

Hazard Analysis Report, BNFL-5193-HAR-01, Rev. 0, BNFL Inc., Richland, Washington, 1997.

Initial Safety Analysis Report, BNFL-5193-ISA-01, Rev. 0, BNFL Inc., Richland Washington, 1998.

RL/REG-97-13, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*, Rev. 6, U.S. Department of Energy, Richland Operations Office, 2000.

Safety Requirements Document, BNFL-5193-SRD-01, Rev. 2, BNFL Inc., Richland Washington, 1998.

TWRS-P Integrated Safety Management Plan, BNFL-5193-ISP-01, Rev. 4b, BNFL Inc., Richland Washington, 1999.

Engineering Study of Alternatives for an LAW Feed Receipt System, RPT-W375PT-PR00002, Rev. 0, BNFL Inc., Richland Washington, May 24, 1999.

[1] BNFL letter from A. J. Dobson to D. C. Gibbs, RU, "Contract No. DE-AC06-96RL13308 – W375 – Request to Amend Authorization Basis Regarding New or Changed Significant and Bounding Hazard Evaluations and Fundamental Aspects of Design," CCN 012864, dated April 23, 2000.
[2] BNFL letter from A. J. Dobson to D. C. Gibbs, RU, "Contract No. DE-AC27-96RL13308 – W375 – Errata to ABAR – W375-00-00014, Part A HAR Significant and Bounding Hazard Evaluation and ISAR Fundamental Aspects of Design Affecting the HAR," CCN 013259, dated May 19, 2000.
[3] DOE letter from D. C. Gibbs, to P. O. Strawbridge, BNFL, "Contract No. DE-AC27-96RL13308 – Regulatory Unit Partial Approval of Authorization Basis Amendment Request, ABAR-W375-00-00014, Rev. 0, Part A Hazard Analysis Report Significant and Bounding Hazard Evaluation & Initial Safety Analysis Report Fundamental Aspects of Design," 00-RU-0455, dated July 6, 2000.
[4] BNFL letter from A. J. Dobson to D. C. Gibbs, RU, "Contract No. DE-AC27-96RL13308 – W375 – Authorization Basis Amendment Request, ABAR-W375-00-00014, Part A Hazard Analysis Report, Significant and Bounding Hazard Evaluation and Initial Safety Analysis Report Fundamental Aspects of Design," CCN 014790, dated July 26, 2000.
[5] Contract No. DE-AC27-96RL13308, between DOE and BNFL Inc., dated August 24, 1998.